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| EXAMINER |
|---|
| FERRIS III, FRED O |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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PTOL-90A (Rev. 04/07)

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *21 April 2004*.

2a)☐ This action is **FINAL**.    2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-37* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1.☐ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)               4)☐ Interview Summary (PTO-413)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)    Paper No(s)/Mail Date. _____ .
3)☒ Information Disclosure Statement(s) (PTO/SB/08)        5)☐ Notice of Informal Patent Application
   Paper No(s)/Mail Date *7/21*.                    6)☐ Other: _____ .

## DETAILED ACTION

*1.      Claims 1-37 have been presented for examination based on applicant's*

*disclosure filed 21 April 2004.  Claims 1-37 are currently pending in this application and*

*stand rejected by the examiner.*

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

*2.      Claims 1-37 are rejected under 35 U.S.C. 112, second paragraph, as being*

*indefinite for failing to particularly point out and distinctly claim the subject matter which*

*applicant regards as the invention.*

*Specifically, the independent claims recite a the phrase "node resources",*

*however, it is unclear from the specification exactly what the node resources consist of.*

*Further, the specification appears to make a distinction between actual system and*

*virtual node resources [0053], however, the claims do not. It is therefore unclear if the*

*"node resources" are actual system resources, or simply virtual resources.  It is further*

*unclear if the nodes actually imply a machine, or merely constitute a virtual machine via*

*software elements (e.g. software per se).*

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or
composition of matter, or any new and useful improvement thereof, may obtain a patent therefor,  .

subject to the conditions and requirements of this title.

**3.    *Claims 28-37 are rejected under 35 U.S.C. 101 because the claimed***

***invention is drawn to non-statutory subject matter.***

*In the case of independent claim 28, the claimed "system" includes only "virtual*

*machine" elements and does not appear to include interaction with an actual physical*

*hardware processor. Therefore it appears to simply require only computer software*

*elements (e.g. program per se).*

*MPEP 2106 recites the following supporting rational for this reasoning:*

"Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when **employed as a computer component**. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. **Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se.** Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is **recorded on some computer-readable medium** it becomes structurally and **functionally interrelated to the medium** and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized."

*The Examiner maintains that the claim 28, as written, is drawn to nonstatutory*

*descriptive material since the claimed "system" appears to consist of only software*

*(program) elements and does not impart any functionality as being employed as a*

*computer component. (e.g. the virtual machine appears to simply be a software element*

*that emulates the actual machine, but the claim does not appear to set forth the actual*

*hardware processor element) Dependent claims inherit the defect of the claims from*

*which they depend.*

## Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**4.      Claims 1-10, 13-22, 27-33, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Cellular Disco: Resource management Using Virtual Clusters on Shared-Memory Multiprocessors", Govil et al, ACM Transactions on Computer Systems, Vol. 18, No. 3 August 2000.**

*Regarding independent claims 1, 14, and 28: Govil teaches method, system, and code for executing a software application in a plurality of computing nodes having node resources (Fig. 1), wherein said nodes include a first node and a second node that intercommunicate over a network (Section 8.2), and said nodes being operative to execute a virtual machine that runs under a guest operating system (Section 3.1), comprising the steps of: running at least a first virtual machine implementer and a second virtual machine implementer on said first node and said second node, respectively (Fig. 1, Fig. 8); and sharing said virtual machine between said first virtual machine implementer and said second virtual machine implementer. (Sections 2.2, 6.0; maintaining coherency through the first operating system will involve sharing virtual machines)*

*(Examiners note: the limitation "virtual machine implementer" has been interpreted to mean replacement of CPU context with a virtual CPU context as disclosed*

in paragraph [0054] of applicants' specification. Virtual machine implementers can also
be _virtual machine monitors_ as disclosed in paragraph [0087] of applicants specification.
These features therefore "read one" the implementation of virtual machines as disclosed
by Govil)

_Per claims 2, 15, 29_: the step of running said software application over said guest
operating system, so that commands invoked by said software application are
monitored or emulated (Section 2.1) by said first virtual machine implementer and said
second virtual machine implementer on said first node and said second node, while said
node resources of said first node and said second node are shared by communication
over said network. (Figs. 1, 8)

_Per claims 3, 16, 31_: one of said first virtual machine implementer and said
second virtual machine implementer is a virtual machine monitor.  (Section 1)

_Per claims 4, 17_: said first virtual machine implementer and said second virtual
machine implementer is an emulator. (Section 2.1)

_Per claims 5, 18, 32_: said first node comprises a first virtual node comprising a
first physical CPU of said first node and a second virtual node comprising a second
physical CPU of said first node. (Sections: 2.1, 4.5)

_Per claims 6, 19, 30_: said virtual machine comprises a first virtual machine and a
second virtual machine, wherein said first virtual machine and said second virtual
machine have a plurality of virtual CPU's that are virtualized by said first virtual machine
implementer based on a first physical CPU and said second virtual machine

implementer based on a second physical CPU, respectively. (Figs. 1, 8, Sections 2.1, 4.5)

Per claims 7, 20: a first virtual node comprises said first physical CPU and said second physical CPU. (Figs. 1, 8, Sections 2.1, 4.5)

Per claims 8, 21: said first virtual machine implementer virtualizes at least one of said virtual CPU's of said first virtual machine based on said first physical CPU and virtualizes at least one of said virtual CPU's in said second virtual machine based on said second physical CPU. (Section 2.1)

Per claims 13, 27, 37: said virtual machine implementer maintaining mirrors of a memory used by said guest operating system in each of said nodes; write-invalidating at least a portion of a page of said memory in one of said nodes; and transferring a valid copy of said portion of said page to said one node from another of said nodes via said network. (mirror image use in memory is well-known in the art would have knowingly been implemented by a skilled artisan. See "mirror image" or "mirroring", Microsoft Computer Dictionary 1997)

Per claims 22 and 33: Govil teaches commands (requests) invoked by virtual machine applications via a network (Sections 2.1, 3.1) and an OS executing at virtual machine node level. (Figs. 1, 8, Sections 2.2, 6.0)

**5.      Claims 9-12, 23-26, and 34-36 are rejected under 35 U.S.C. 103(a) in further view of U.S. Patent 6,862,735 issued to Slaughter el al.**

Govil renders obvious the elements of independent claims 1, 14, and 28 as previously cited above.

However, Govil does not explicitly disclose the additional elements relating a wrapper for receiving calls to a device driver.

Per claims 9, 23, 34: providing a management system for said first virtual machine implementer and said second virtual machine implementer to control said first node and said second node, respectively, wherein said management system comprises a wrapper for receiving calls to a device driver (Fig. 1, CL3-L19-33) from said first virtual machine implementer, said wrapper invoking said device driver according to a requirement of said first virtual machine implementer.

Per claims 10, 24, 35: The method according to claim 9, further comprising the step of providing a virtual PCI controller for said management system to control a physical PCI controller in one of said nodes. (Fig. 5)

Per claims 11, 25, 36: providing a virtual DMA controller for said management system to control a physical DMA controller in one of said nodes. (Govil: Section 2.1)

Per claims 12, 26: providing a virtual PCI controller to control a physical PCI controller in one of said nodes; and during a bootup phase of operation scanning a device list with said virtual PCI controller to identify devices having onboard DMA controllers. (Govil: Section 2.1)

Accordingly, as skilled artisan tasked with realizing a node based virtual machine method, code, and system, and having access to the analogous art teachings of Govil and Slaughter would have knowingly combined the features of Govil relating to a

wrapper for receiving calls to a device driver to achieve the predictable results of

management system control for a virtual machine.

### Conclusion

6.      The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

US Patent 7,158,972 issued to Marsland teaches virtual machines in a node

configuration.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Fred Ferris whose telephone number is 571-272-3778

and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry

of a general nature relating to the status of this application should be directed to the

group receptionist whose telephone number is 571-272-3700. If attempts to reach the

examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can

be reached at 571-272-2279. The Official Fax Number is: (571) 273-8300

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